In-situ Observation on Rainfall Infiltration in Loess

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In-situ Observation on Rainfall Infiltration in Loess

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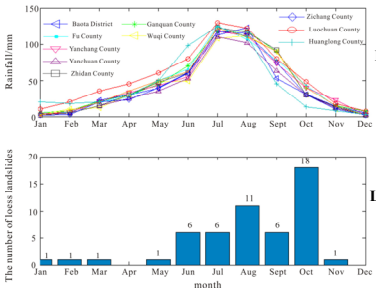
The main parts

1. Introduction
2. Introduction of monitoring area
3. Monitoring site and instrument arrangement
4. Analysis of the monitoring results
5. Problem discussion

Introduction



Rainfall distribution

Landslides distribution

Introduction

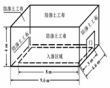
The natural and artificial rainfall tests to determine the depth of rainfall infiltration previously

X.B.TU
2~3 m

Zhan liangtong
2 m

A.G.Li
4 m

Li weichao,Dai fuchu
2 m

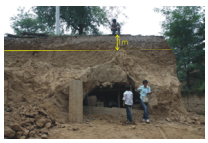


Liu haisong
2.7 m

Ding yong,Wang jiading
4 m

Introduction

The depth of rainfall infiltration in upright loess profile



Ganquan county, Shaanxi province
The vertical depth of rainfall infiltration is about 1 m we observed

Ganquan county, Shaanxi province
The horizontal depth of rainfall infiltration is about 0.95 m we observed

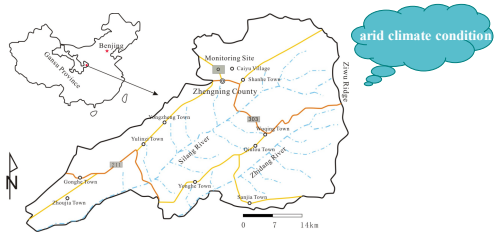
Introduction

⇨ sinkhole

These water paths only occur in unloading area which always in the edge of loess tableland, but rare in the center

⇨ interconnected crack

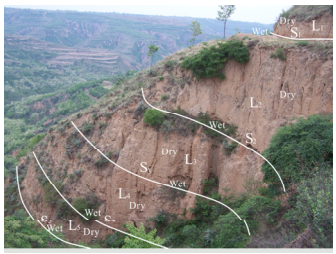
Introduction of monitoring area



Location of the monitoring area

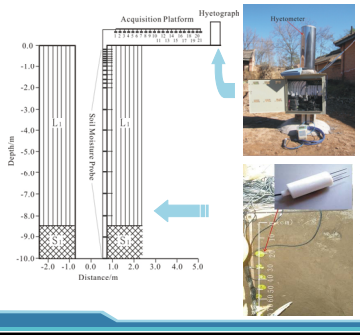
Introduction of monitoring area

Loess and paleosol interbedded



loess is dry, paleosol is wet.

Monitoring site and instrument arrangement



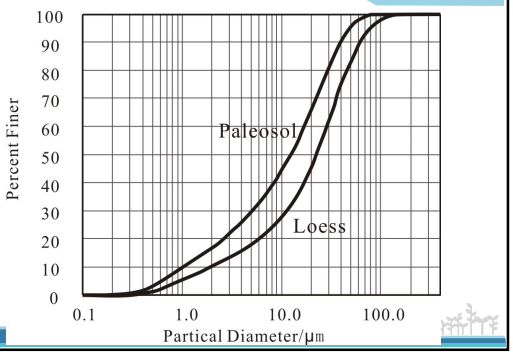
Rain gauge

Moisture content probe
21 in total

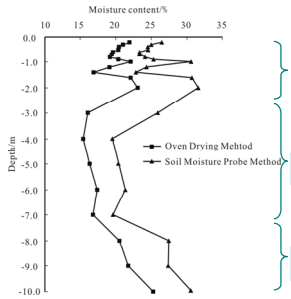
Monitoring site and instrument arrangement

Physical and mechanical indexes	Loess	Paleosol
Bulk density(g/cm^3)	1.44	1.64
Dry density(g/cm^3)	1.24	1.35
Moisture content(%)	16.3	21.9
Saturated moisture content (%)	43.6	37.2
Specific gravity	2.70	2.71
Void ratio	1.177	1.007
Plastic limit(%)	21.7	21.3
Liquid limit(%)	29.4	31.6
Compressibility coefficient(MPa-1)	0.82	0.62
Coefficient of collapsibility	0.079	0.043
Vertical coefficient of permeability (m/s)	2.55×10^{-6}	5.36×10^{-8}
Horizontal coefficient of permeability (m/s)	1.72×10^{-6}	2.12×10^{-8}
Clay content(≤2μm;%)	17.9	29.6

Monitoring site and instrument arrangement



Analysis of the monitoring results



High moisture content
More volatile
Affected greatly by rainfall and evaporation

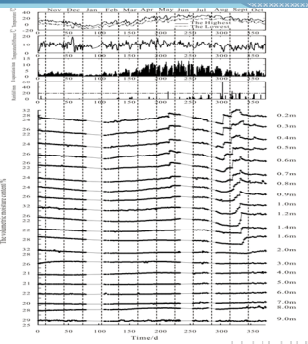
Low moisture content
Minor changed

High moisture content
Influenced by stratum structure

Analysis of the monitoring results

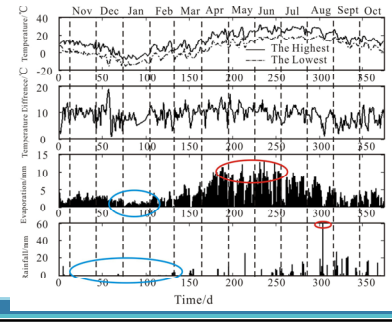
Temperature
Temperature Difference
Evaporation
Rainfall

Moisture content of different depth

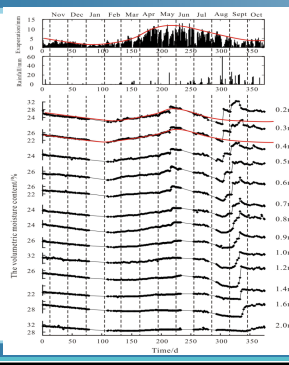


Analysis of the monitoring results

Temperature, evaporation and rainfall changed in annual cycle



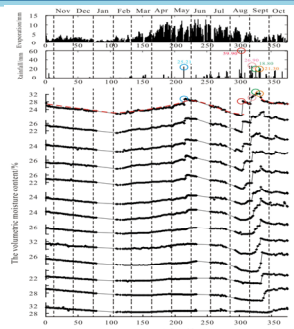
Analysis of the monitoring results



The moisture content of layers within 2 meters were also changed in annual cycle

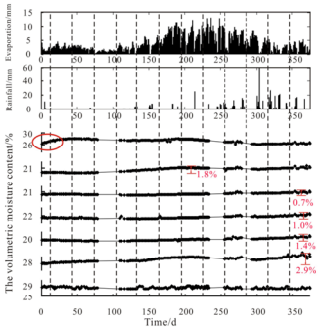
The moisture content within 2 meters changed in accordance with evaporation

Analysis of the monitoring results



The rainfall which can cause the mutation of moisture content is about 18 mm/d

Analysis of the monitoring results



Periodically stable

Increased smoothly

Non-annual change

Smaller growth

larger growth

larger fluctuation

Problem discussion

What is the main factor that affect the annual variation of the background value of moisture content ?

How far can the moisture migrate in unsaturated zone in loess tableland which groundwater level is often very deep? Whether it can reach the groundwater level and become the main part to supplement groundwater?